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Chapter One

ROAD DESIGN PROCESS

Introduction

Chapter One documents the basic approach used by MDT in its road design process. The chapter presents a network which graphically illustrates the development of a "typical" project. This is followed by a brief description of each activity within the network. In their use of Chapter One, the users should consider the following:

1. Precedence Activity Network. The network of the road design process is a precedence activity network (see Figure 1A). An "activity" occurs when a significant, discrete event occurs and/or when the responsibility for the project (activity) is transferred from one unit to another. The "precedence" nature of the network implies that an activity cannot occur until all activities preceding that one have been completed. However, the user must be aware that some flexibility is necessary to apply this network to the various types of road design projects.
2. Project Application. The network represents an approximate road design process for a relatively complicated project. Not every activity will be applicable to every project; i.e., some activities will represent "zero" time on relatively minor projects. In addition, some major projects are more complex than illustrated in the network. However, the user should find that projects which are developed according to this process will have fewer management problems.

The illustrated network assumes a project designed in-house. The process for a consultant-designed project will be similar, except that communication lines exist between MDT and the consultant for MDT review and approval.

3. Lines of Communication. The rigid application of the network would lead to predetermined, precise points at which communication occurs between units. This is neither realistic nor desirable. Communication between units must be continuous. This will result in fewer problems and fewer "surprises" in the road design process.
4. Road Design Emphasis. The objective of the network is to illustrate the significant activities for the road design element of a road design project. Other project development elements (e.g., environment, bridge design, right-of-way) are illustrated as supplementary activities which diverge from and converge with the road design process (i.e., the main spine of the network). The user is

referred to the Project Management System manual for detailed descriptions of the activities for other project development elements.

5. Other Manual Chapters. The *Montana Road Design Manual* contains several other chapters which provide complementary information to Chapter One. The designer should review these chapters for more information on the road design process. In particular, Chapter One should be used in combination with Chapter Two "Road Design Coordination" and Chapter Four "Plan Preparation," which describes the specific content of individual plan sheets.

INSERT
Figure 1A

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Program Project

Activity No.: 01

Responsible Unit: Rail, Transit and Planning Division

Activity Description:

The MDT District Offices submit to the Rail, Transit and Planning Division nominations from their District for capital improvement projects. The District Office prepares a very rough project scope of work and a very rough project cost estimate. Based on a State-wide assessment of highway improvement needs and available funds, the Rail, Transit and Planning Division develops the Department's Program of Projects. This will establish an individual project as an active project for further development.

The Rail, Transit and Planning Division notifies the Preconstruction Engineer of all newly programmed projects. The Division will also provide a State project number for each project, which is used for preliminary engineering charges. For each project, the Preconstruction Engineer will decide whether the project will be designed in-house or by a consultant and, for Department-designed projects, will decide which Section within the Preconstruction Bureau will be responsible for the project.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Transfer Project to Area Project Supervisor

Activity No.: 02

Responsible Unit: Preconstruction Engineer

Activity Description:

For those projects which will be designed in-house and which will be the responsibility of the Road Design Section, the Preconstruction Engineer will transfer the project, through the Road Design Engineer, to the Area Project Supervisor who will manage the project. The Area Project Supervisor will have the overall day-to-day responsibility for advancing the project through the road design process. He/she will:

1. coordinate directly with other units in the Department;
2. attend all internal meetings and field inspections;
3. be responsible for ensuring that the project design meets all Department criteria and procedures;
4. report directly to the Road Design Engineer on all significant project activities, problems and developments; and
5. participate in the public involvement process

To prepare for the Preliminary Field Review (Activity 03), the Area Project Supervisor accumulates and reviews all available information for the proposed project and requests additional information as needed. As appropriate, the information may include (but not be limited to):

1. planning reports or studies,
2. as-built plans,
3. letters/correspondence on the project,
4. crash data,
5. traffic data and turning movements,
6. documentation on any public or private meetings,
7. original surveys, and
8. Aerial photos.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Conduct Preliminary Field Review

Activity No.: 03

Responsible Unit: Area Project Supervisor

Activity Description:

The purpose of the Preliminary Field Review (PFR) is to determine major design features, project-related issues and any potential problems. The Area Project Supervisor will arrange the PFR. Typically, the following individuals will be invited to the PFR, as appropriate:

1. the Area Project Supervisor,
2. the District Administrator,
3. the Division Maintenance Chief,
4. the Engineering Services Engineer/Supervisor,
5. a representative from the Consultant Design Section,
6. a representative from the Hydraulics Section,
7. a representative from the Bridge Bureau,
8. a representative from the Environmental Services,
9. a representative from the Right-of-Way Bureau,
10. a representative from the District Construction Office,
11. a representative from the Geotechnical Section,
12. a representative from the Civil Rights Bureau (ADA Coordinator),
13. Tribal Affairs Coordinator,
14. FHWA (on applicable projects),
15. local officials, and
16. others as deemed appropriate.

During the Preliminary Field Review, the Area Project Supervisor will determine if the project will be designed using District Office or Central Office road design personnel. In either case, the Area Project Supervisor maintains overall responsibility for the project.

Chapter Three "Administrative Policies and Procedures" presents additional information on the PFR.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Preliminary Field Review Report

Activity No.: 04

Responsible Unit: Area Project Supervisor

Activity Description:

The Area Project Supervisor, or designee, prepares the Preliminary Field Review (PFR) Report, which documents the findings from the PFR (Activity 03). The PFR Report is prepared for the Road Design Engineer's signature, and it is submitted to the Preconstruction Engineer for approval. After the Preconstruction Engineer has approved the Report, copies of the PFR Report will typically be distributed to the preconstruction project file and to the following individuals:

1. Road Design Engineer,
2. Operations Engineer,
3. all Engineering Bureau Chiefs,
4. Preconstruction Design Engineer,
5. District Administrator,
6. Rail, Transit and Planning Division Administrator,
7. Environmental Services Engineer/Supervisor,
8. all parties involved in the field review,
9. Manager — Engineering Management Unit,
10. Tribal Affairs Coordinator (as appropriate),
11. ADA Coordinator,
12. FHWA (NHS projects), and
13. any other individuals or units as deemed appropriate.

All parties receiving a copy of the PFR Report are requested to provide comments on the Report. Concurrence of the Report will be assumed if no comments are received by the specified date.

One major objective of Activities 03 and 04 is to notify all parties of the proposed Project Scope of Work; i.e., will the project be a pavement preservation, overlay and widening, or reconstruction project? See Chapter Eight "Basic Design Controls" for definitions of the project scopes of work.

Chapter Three "Administrative Policies and Procedures" presents additional information on the content and format of the PFR Report.

At this point, the Area Project Supervisor distributes a draft News Release to the Rail, Transit and Planning Division with copies to the Chief Engineer, the Preconstruction Engineer, the District Administrator and the Supervisor of the Environmental Services.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Disseminate News Release

Activity No.: 05

Responsible Unit: Area Project Supervisor/Rail, Transit and Planning Division

Activity Description:

Based on the Preliminary Field Review Report (Activity 04) and the memorandum requesting a news release from the Area Project Supervisor, the Information Officer within the Rail, Transit and Planning Division will prepare and disseminate the news release for the project. As indicated in Figure 1A, Activity 05 must occur before initiation of the NEPA process (Activity 08).

The News Release outlines the general project scope, alerts various entities that a project has been initiated and starts the information-gathering process from the public to determine which concerns and impacts must be considered. On projects where significant outside input is anticipated, a Letter of Intent may be more appropriate than a News Release.

The Area Project Supervisor distributes a draft New Release to the Rail, Transit and Planning Division with copies to the Chief Engineer, the Preconstruction Engineer, the District Administrator and the Supervisor of the Environmental Services.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Initiate Right-of-Way Process

Activity No.: 06

Responsible Unit: Right-of-Way Bureau

Activity Description:

Based on the Preliminary Field Review Report (Activity 04), the Right-of-Way Bureau will initiate the R/W process. This includes obtaining the existing R/W plans and researching the existing R/W status within the project limits, including:

1. R/W titles and deeds,
2. permanent easements,
3. property lines and owners,
4. existing limits of access,
5. existing stockpass rights, and
6. irrigation studies.

The objective of Activity 06 is to perform the background work necessary to prepare for the preparation of the R/W plans (Activities 20, 28 and 36).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Preliminary Utilities Evaluation

Activity No.: 07

Responsible Unit: Utilities Section

Activity Description:

Based on the Preliminary Field Review Report (Activity 04), the Utilities Section within the Right-of-Way Bureau will perform a preliminary evaluation of the project impacts on existing utilities. The following items of work are typically performed:

1. The Utilities Section will coordinate with the Road Design Section and will, if needed, request an underground survey to determine the depths and location of existing underground utilities within the project limits, especially natural gas lines, fiber optic cables, water supply and sanitary lines in urban areas.
2. Any major above-ground utilities which may be impacted by the project will be identified at the Preliminary Field Review. The Utilities Section will prepare preliminary cost estimates to determine if a special effort should be exercised to avoid certain utilities.
3. The Utilities Section will notify any utility companies which will be potentially impacted by the upcoming project, and the Section will request that the utility companies contact MDT if they plan any work in the vicinity of the project.

The Utilities Section will document its findings in a report or memorandum which will be submitted to the Area Project Supervisor. This should occur before the preliminary alignment and grade is prepared (Activity 21).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Initiate NEPA Process

Activity No.: 08

Responsible Unit: Environmental Services

Activity Description:

Based on the Preliminary Field Review Report (Activity 04), the Environmental Services will perform the preliminary work to evaluate the environmental impacts of the proposed project. This will include:

1. compiling the inventory of environmental features (e.g., identifying properties eligible for the National Register of Historic Places, wetlands, sensitive species, Section 4(f));
2. identifying all environmentally sensitive areas (e.g., hazardous waste sites) and evaluating potential impacts;
3. determining with some confidence that the project will not require an Environmental Impact Statement (EIS);
4. proposing alternative mitigation measures;
5. initiating early coordination activities with regulatory agencies on all stream crossings; and
6. initiating requests for specific information to various community, county, State, tribal and Federal agencies to assess project-related environmental impacts.

As indicated in the Road Design Network, if no EIS will be needed, the Environmental Services will provide the information from Activity 08 to the Area Project Supervisor before the preparation of the preliminary plan/profile sheets (Activity 19).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Soils Survey

Activity No.: 09

Responsible Unit: District Office

Activity Description:

Based on the Preliminary Field Review Report (Activity 04), the District Office will conduct a soils survey within the project limits. The primary purpose of the survey is to gather the information needed to determine the pavement design (Activity 10). The most important characteristic is the structural support value of the existing soils. The soils survey may also identify basic properties of the soil (e.g., AASHTO soils classification, areas of subexcavation, subsurface moisture conditions), and determine recommendations for shrink/swell factors. The District soils survey will not investigate major geotechnical features within the project limits. This will be performed by the Geotechnical Section in Activities 11 and 24.

The District Office will prepare a Soils Report and submit it to the Materials Services Section for the pavement design (Activity 10). The Report will also be submitted to the Area Project Supervisor for use in developing the road design (e.g., preparation of cross sections).

If the proposed roadway alignment changes substantially during the design process, additional soils information will be required (after Activity 23).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Pavement Design

Activity No.: 10

Responsible Unit: Materials Bureau

Activity Description:

Based on the Soils Report (Activity 09) and Preliminary Field Review Report (Activity 04), the Materials Bureau will perform the detailed pavement design analysis. For new pavements or full-depth reconstruction, the objectives of the analysis will be to:

1. select the pavement type (concrete or bituminous);
2. determine the overall pavement thickness and thicknesses of individual layers;
3. for concrete pavements, determine the reinforcement details; and
4. determine any special surfacing design features (subgrade admixtures, subdrainage design, use of geotextiles).

For existing pavements, the Materials Services Section will develop a rehabilitation strategy. This may include, for example, determining pavement overlay depths, patching needs, crack repair, joint repair, recycling, etc.

For both new and existing pavements, the objective of Activity 10 is to develop an array of pavement design options. The selection of the final pavement design is an iterative process involving coordination among the Materials Bureau, the Road Design Section and the District.

The Materials Bureau will document its recommendations in a Pavement Design Report. This will be submitted to the Road Design Engineer for incorporation into the preliminary plan/profile sheets (Activity 19).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Conduct Preliminary Field Geotechnical Investigation

Activity No.: 11

Responsible Unit: Geotechnical Section

Activity Description:

Based on the Preliminary Field Review Report (Activity 04), the Geotechnical Section will conduct a preliminary field review of the project site to investigate its geotechnical characteristics. The nature and depth of the investigation will be determined on a project-by-project basis. One of the primary factors which will determine the scope of the investigation will be the anticipated amount of earthwork for the project. The preliminary geotechnical field investigation may include:

1. a field reconnaissance of the surface indications of subsurface properties (e.g., surface soils, rock exposures, stream-deposited soils, gullies, stream banks, water surface flows, existing structures in the area, topography, vegetation);
2. an evaluation of the potential for slides;
3. an investigation of any wetlands in the vicinity of the project;
4. for proposed cuts, a determination of the slope stability characteristics and the need for special treatments (e.g., benching);
5. testing of materials from the site by Department laboratory tests;
6. an evaluation of any erosion potential within the project limits; and
7. an evaluation of foundations for bridges and long culverts.

The Geotechnical Section will prepare a Geotechnical Report documenting the findings from its preliminary investigation. The Report will be submitted to the Road Design Engineer for input into the preparation of the preliminary plan/profile sheets (Activity 19). An in-depth subsurface investigation (Activity 24) may be needed after the Preliminary Alignment and Grade review (Activity 21).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Initiate Traffic Engineering Evaluation

Activity No.: 12

Responsible Unit: Traffic Engineering Section

Activity Description:

Based on the Preliminary Field Review Report (Activity 04), the Traffic Engineering Section will initiate its evaluation of the traffic engineering and those geometric design elements which are the responsibility of the Section. At this stage of project development, the Section will be scoping out the needs for the project in anticipation of performing the detailed traffic engineering and geometric design work (Activities 32 and 43). The evaluation may include a determination of:

1. the warrants for truck-climbing lanes;
2. the warrants for highway lighting;
3. signalization warrants;
4. a highway capacity analysis;
5. intersection geometrics (e.g., the need for exclusive left-turn lanes at unsignalized intersections);
6. the warrants for, type of and configuration of any interchanges within the project limits;
7. the type of and design of the median, if needed, for the highway section;
8. the anticipated traffic control treatment at railroad/highway grade crossings; and
9. power and communication needs.

The Traffic Engineering Section will prepare a Traffic Report documenting its findings and recommendations. This Report will be submitted to the Road Design Engineer.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Initiate Railroad Process

Activity No.: 13

Responsible Unit: Utilities Section

Activity Description:

Based on the Preliminary Field Review Report (Activity 04), the Utilities Section will initiate the railroad process by identifying the project impacts on any railroads. The basic objective of this Activity is to identify any potential major problems and to prepare for the detailed design work and coordination with the railroad companies (Activity 33). The Utilities Section will notify any railroad companies which may be impacted by the project so that they will be prepared for Activity 33.

The Utilities Section will notify the Area Project Supervisor of any potential impacts with railroads before the preliminary alignment and grade is prepared (Activity 21).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Conduct Preliminary Surveys

Activity No.: 14

Responsible Unit: District Office/Photogrammetry and Survey Section

Activity Description:

The type of preliminary survey(s) required (conventional, control, aerial and/or hydraulic) is determined at the Preliminary Field Review (Activity 03) and documented in the Preliminary Field Review Report (Activity 04) and the Survey Request Worksheet. The Area Project Supervisor will coordinate with the District Office and determine what survey information must be gathered. The needed survey information may include but not be limited to:

1. existing field conditions (topography, vegetation, existing structures and road design features, etc);
2. drainage features (bodies of water, open channels, channel slopes and cross sections, existing drainage appurtenances, etc.);
3. irrigation facilities;
4. existing field landmarks;
5. existing utilities (above and below ground);
6. existing right-of-way markers and property lines;
7. alignment and cross section of any existing intersecting roads and driveways near the bridge; and
8. elevations and locations of existing features required to provide disabled access facilities.

District survey crews conduct all surveys except aerial surveys, and the Photogrammetry and Survey Section checks the District survey for accuracy and completeness. Where needed, the Photogrammetry and Survey Section conducts an aerial survey based on targets provided by the District and the District performs a pick-up ground survey, if necessary.

If a drainage and/or irrigation survey (HYD-1 survey) is conducted by the District, the Photogrammetry and Survey Section will submit the survey directly to the Hydraulics Section for analysis.

See the *MDT Survey Manual* for more information on surveys.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Hydraulic Design of Cross-Drainage Structures

Activity No.: 15

Responsible Unit: Hydraulics Section

Activity Description:

Based on the information from the HYD-1 survey on drainage and/or irrigation features (Activity 14), the Hydraulics Section will perform the detailed hydrologic and hydraulic analysis for all anticipated cross-drainage structures, including major irrigation facilities which cross the proposed highway. To perform the hydraulic analysis, the Hydraulics Section will:

1. conduct the hydrological calculations (based on rainfall data, drainage basin characteristics, USGS data, etc.);
2. evaluate the existing open drainage system (e.g., channel size for stream crossing); and
3. design all culverts larger than 600 mm for drainage and 450 mm for irrigation which cross the roadway and are not classified as bridges (e.g., headwater calculations; roadway overtopping; FEMA requirements; culvert type, size and slope; inlet configurations; and energy dissipators).

A primary objective of this Activity will be for the Hydraulics Section to prepare to react to the preliminary alignment and grade to determine if the grade is consistent with the expected cross-drainage design. The Road Design Section will prepare the preliminary alignment and grade in Activity 21 and distribute the proposal in Activity 23 to the Hydraulics Section.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Bridge Hydraulics

Activity No.: 16

Responsible Unit: Hydraulics Section

Activity Description:

Based on the information from the HYD-1 survey on drainage and/or irrigation features (Activity 14), the Hydraulics Section will perform the detailed hydrologic and hydraulic analysis for any bridges over a waterway. The analysis of the waterway opening will include:

1. conducting the hydrological calculations (based on rainfall data, drainage basin characteristics, USGS data, etc.);
2. determining the freeboard or overtopping elevations;
3. performing the hydraulic analysis to determine the required size of the waterway opening to pass the design flood and to meet the backwater allowances;
4. evaluating debris impacts;
5. assessing impacts on floodplains based on FEMA regulations;
6. evaluating hydraulic scour to assist in determining the proper foundation design; and
7. making any permanent erosion protection recommendations for the embankments beneath the bridge.

The Hydraulics Section will submit a Hydraulics Report to the Bridge Area Project Supervisor documenting the findings from the bridge hydraulics evaluation. The Report will provide:

1. the water surface elevation for the design-year flood;
2. a suggested low beam elevation;
3. the necessary bridge waterway opening dimensions, skew angle and channel centerline station; and
4. the results of the hydraulic scour analysis.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Determine Bridge End Elevations

Activity No.: 17

Responsible Unit: Bridge Bureau

Activity Description:

For a proposed bridge over a waterway, the Bridge Bureau will determine the bridge end elevations based on the bridge hydraulics analysis (Activity 16) and project survey (Activity 14). For a bridge over other than a waterway, the Bridge Bureau will determine the bridge end elevations directly from the survey information (Activity 14).

As indicated in the Road Design Network, the Bridge Bureau is determining the bridge end elevations in close coordination with the Hydraulics Section and Road Design Section's determination of the preliminary alignment and grade (Activity 21). Through an iterative process, the three units will determine a mutually acceptable grade which accommodates both the desired road design, hydraulic waterway opening and bridge elevation.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Plot Survey Data

Activity No.: 18

Responsible Unit: Road Design Section/District/Photogrammetry and Survey Section

Activity Description:

Based on the survey information from Activity 14, the survey information will be plotted as follows:

1. Contour Map. The Road Design Section will develop a contour map of the project site. Whether the data is collected via manual means or through a data collector, the mapping file will be prepared in DGN format.
2. Conventional Survey. This type of survey (where the centerline survey is recorded by stations and offsets) is only performed where no additional right-of-way is required. The District will forward the survey information to the Area Project Supervisor, and the Engineer will submit the information to the Survey Section for checking.
3. Field Survey (Electronic Data Collection). The Road Design Section will prepare a strip map and digital terrain model (DTM) for the project.
4. Aerial Survey (Electronic Data Collection). The Survey Section will prepare a strip map and a DTM and forward these to the Area Project Supervisor. The Road Design Section will strip cross sections from the DTM as needed for the project.
5. Control Traverse Diagram. A District survey crew will conduct the control traverse survey. The Photogrammetry and Survey Section checks the control traverse survey data and then plots the control traverse diagram. This diagram will establish a permanent, recoverable horizontal and vertical control system to which all design elements may be tied, including topographic, geologic, hydraulic and right-of-way information. The control traverse will be used to lay out the road design centerline and right-of-way. The road designer will retrieve the control traverse plot and coordinate table for inclusion in the plans.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Preliminary Plan/Profile Sheets

Activity No.: 19

Responsible Unit: Road Design Section

Activity Description:

The designer will prepare the preliminary plan/profile sheets for the road design project. These sheets will be based on information received from:

1. the preliminary environmental evaluation (Activity 08),
2. the pavement design (Activity 10),
3. the preliminary geotechnical evaluation (Activity 11),
4. the preliminary surveys (Activity 14), and
5. the geometric/traffic information (Activity 12).

The preliminary plan/profile sheets will become the primary working drawings for all succeeding work on the project. As appropriate for the project, the plan and profile sheets may include:

1. all topographical data from the aerial and/or field survey;
2. all relevant existing on-the-ground survey information;
3. plan views of underground utilities;
4. in profile view, crossing elevations of underground utilities;
5. existing centerline elevations; and
6. ADA curb ramp location and orientation as well as any other design features for disabled access.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Initiate Right-of-Way Plans

Activity No.: 20

Responsible Unit: R/W Design Plans Section

Activity Description:

Based on the preliminary plan/profile sheets (Activity 19) and the initial right-of-way process (Activity 06), the R/W Design Plans Section within the Right-of-Way Bureau will initiate the preparation of the right-of-way plans. The Design Plans Section will extract the plan portion of the strip map from CADD to perform its work. This activity includes:

1. setting up the sheets and stationing for the eventual R/W plans,
2. recording the section corner information,
3. recording property ownership information, and
4. plotting the existing R/W.

The initial preparation of the R/W plans will enable the Design Plans Section to perform the R/W design (Activity 28) and finalize the R/W plans (Activity 36).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Lay Preliminary Alignment and Grade

Activity No.: 21

Responsible Unit: Road Design Section

Activity Description:

The designer will use the preliminary plan/profile sheets (Activity 19) to lay the preliminary alignment and grade. The Area Project Supervisor will ensure that the proposed design meets the Department's criteria presented in Chapter Nine "Horizontal Alignment" and Chapter Ten "Vertical Alignment." This activity will include:

1. computing curve data for all horizontal curves,
2. checking the horizontal sight distance around horizontal curves,
3. developing the profile grade line for the project,
4. computing all vertical curves,
5. checking stopping sight distances for all vertical curves and evaluating the practicality of providing passing sight distance,
6. working with the Bridge Bureau and Hydraulics Section to ensure compatibility between the elevation of any bridges and culverts within the project limits and the profile grade (see Activity 17), and
7. plotting soils data on profile.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Process Geometric Design Exceptions

Activity No.: 22

Responsible Unit: Area Project Supervisor

Activity Description:

The Area Project Supervisor will identify any exceptions to the Department's geometric design criteria. Chapter Eight "Basic Design Controls" discusses those design elements which require written approval when not met (e.g., roadway width, horizontal curvature, vertical curvature), and it describes the approval process, both for MDT and FHWA approval. The applicable chapters within the *Montana Road Design Manual* present the Department's specific criteria for the controlling geometric design elements.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Distribute Preliminary Alignment and Grade

Activity No.: 23

Responsible Unit: Area Project Supervisor

Activity Description:

After any proposed design exceptions have received the necessary approvals (Activity 22), the Area Project Supervisor will distribute the preliminary alignment and grade (Activity 21) to the following for comment:

1. the Right-of-Way Bureau,
2. the Hydraulics Section,
3. the Environmental Services,
4. the Bridge Bureau,
5. the Traffic Engineering Section,
6. the Materials Bureau,
7. the District Administrator, and
8. any others as deemed appropriate.

The purpose of the distribution is to solicit input on the proposed alignment and grade from all interested parties. The Area Project Supervisor will evaluate all comments and determine if modifications to the alignment and grade are necessary. It may be warranted to schedule an Alignment Field Review to resolve significant issues. The need for a field review will be determined on a project-by-project basis. If held, attendees at the field review typically include:

1. the Area Project Supervisor,
2. the District Administrator,
3. the Engineering Services Supervisor,
4. the Design Supervisor,
5. other design personnel who may be involved with the project,
6. the Consultant, for consultant-designed projects,
7. FHWA (NHS projects),
8. local officials (if deemed appropriate), and
9. others as deemed appropriate.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Conduct Subsurface Investigation

Activity No.: 24

Responsible Unit: Geotechnical Section

Activity Description:

Based on the Geotechnical Section's preliminary field investigation (Activity 11) and the preliminary alignment and grade (Activity 21), the Geotechnical Section will conduct, if necessary, an in-depth subsurface investigation of the project site to determine the geotechnical properties of the:

1. native soils,
2. rock exposures,
3. stream-deposited soils,
4. topography, vegetation, and
5. general hydrogeologic characteristics.

The Geotechnical Section will report its findings from its subsurface investigation to the Area Project Supervisor before preparation of the Alignment Review Report (Activity 25).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Alignment Review Report

Activity No.: 25

Responsible Unit: Area Project Supervisor

Activity Description:

The Area Project Supervisor or his designee will prepare the Alignment Review Report after all comments have been received and resolved on the preliminary alignment and grade (Activity 23) and the Geotechnical Section has reported its findings from the in-depth subsurface investigation (Activity 24), if conducted. The Alignment Review Report will document any changes which need to be made to the alignment and grade. Copies of the Report will typically be distributed to the preconstruction file and the following individuals:

1. Project Development Engineer,
2. all Bureau Chiefs,
3. Preconstruction Design Engineer,
4. District Administrator,
5. Rail, Transit and Planning Division Administrator,
6. those attending the field review (if held), and
7. any others as deemed appropriate.

Chapter Three discusses in detail the format and content of the Alignment Review Report.

After comments have been submitted and modifications to the alignment have been incorporated into the plans, the preliminary construction limits will be submitted to the Right-of-Way Plans Section to perform the R/W design (Activity 28).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Draft Environmental Documents

Activity No.: 26

Responsible Unit: Environmental Services

Activity Description:

Based on an evaluation of the environmental impacts of the proposed project, the Environmental Services will initiate the environmental process and prepare the draft environmental documents. This process will typically include:

1. an assessment of early coordination needs;
2. a determination of the environmental class of action based on an evaluation of the project's:
 - a. right-of-way impact;
 - b. impact on land use;
 - c. ecological effects (air, noise, water);
 - d. historical/archeological impacts;
 - e. social/economic impacts;
 - f. predicted effects on transportation patterns;
 - g. Section 4(f) and 6(f) involvement;
 - h. impact on wetlands;
 - i. impact on wildlife; and
 - j. hazardous waste sites;
3. the preparation of the necessary draft environmental documents which will be either:
 - a. an Environmental Impact Statement (EIS),
 - b. an Environmental Assessment (EA), or
 - c. a Categorical Exclusion (CE) determination; and
4. proposing alternative mitigation measures;
5. the identification of all necessary permits (e.g., Section 404, water quality permit) and an initiation of the permit approval process; and
6. processing requests for specific information to various community, county, State, tribal and Federal agencies to assess project-related environmental impacts.

If a project will not have a significant individual or cumulative impact on the social, economic or environmental character of the project site, it will be classified as a CE project. Note that a CE classification will end the National Environmental Policy Act (NEPA) process. An Environmental Assessment (EA) will be prepared for an action where the significance of the environmental impacts is not clearly established.

The draft environmental documents will be prepared in coordination with the preparation of the Alignment Review Report (Activity 25). The Environmental Services will complete the draft environmental documents and provide the information to the Area Project Supervisor before the Scope of Work Report is prepared (Activity 35).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Implement Public Information Program

Activity No.: 27

Responsible Unit: Rail, Transit and Planning Division

Activity Description:

After dissemination of the project news release (Activity 05), Public Affairs within the Rail, Transit and Planning Division will implement the public information program. The objective of the program is to provide a forum through which information on MDT projects can be communicated to the general public. As indicated in the Project Development Network, this is a continuous process which extends into the construction phase of the project. The responsibility of Project Area Supervisor and Rail, Transit and Planning Division includes:

1. preparing and disseminating any additional News Releases;
2. processing any correspondence from the general public to the Project Area Supervisor responsible for the project; and
3. working with the District Administrator to make arrangements and provide logistics for public information meetings (Activity 34), if controversial issues arise.

The News Release outlines the general project scope, alerts various entities that a project has been initiated and starts the information-gathering process from the public to determine which concerns and impacts must be considered. On projects where significant outside input is anticipated, a Letter of Intent may be more appropriate than a News Release.

The Project Area Supervisor distributes a draft News Release to the Rail, Transit and Planning Division with copies to the Chief Engineer, the Preconstruction Engineer, the District Administrator and the Supervisor of the Environmental Services.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Right-of-Way Design

Activity No.: 28

Responsible Unit: R/W Design Plans Section

Activity Description:

Based on the Alignment Review Report and the submittal of the preliminary construction limits (Activity 25), the R/W Design Plans Section will perform the R/W design for the project. This will include:

1. determining the R/W widths for the project;
2. determining the appropriate level of access control for the facility; and
3. determining the need for construction permits, permanent R/W easements and/or temporary easements.

Chapter Eleven discusses the Department's detailed criteria for the R/W design.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Initiate Utility Plans

Activity No.: 29

Responsible Unit: Utilities Section

Activity Description:

After the Alignment Review Report (Activity 25), the Road Design Section will notify the Utilities Section and will provide the R/W Plans Sections with a set of plans with the existing utilities and conflicts plotted as determined from the survey (Activity 14). The road designer will list the utility conflicts by station and offset from centerline and place the utilities on the cross sections. The R/W Plans Section will prepare the Utility Plans and submit these to the Utilities Section. The utility companies are responsible for preparing all utility adjustment/relocation plans in coordination with the Utilities Section. The overall objective of this Activity is to set up the utility plans in preparation for the detailed implementation of the utility process (Activity 37).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Complete Roadway Hydraulics

Activity No.: 30

Responsible Unit: Hydraulics Section

Activity Description:

Based on the Alignment Review Report (Activity 25) and the hydraulic design of cross-drainage structures (Activity 15), the Hydraulics Section will complete the hydraulic design of the roadway elements. This will include, where applicable:

1. finalizing the design of the cross-drainage system;
2. performing the pavement drainage analysis to determine the approximate location and spacing of inlets (Note: The road designer will determine the exact location of the inlets to ensure that the inlets are located at low spots and to avoid conflicts with utilities, curb ramps, etc.);
3. designing the storm drainage trunk line system;
4. determining the need for any special ditch linings for permanent erosion protection; and
5. complying with all FEMA regulations.

The Hydraulics Section will submit the necessary information to the Area Project Supervisor for incorporation into the detailed road design plans (Activity 44).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Preliminary Layout of Bridge

Activity No.: 31

Responsible Unit: Bridge Bureau

Activity Description:

Based on the Alignment Review Report (Activity 25), the bridge hydraulics (Activity 16) and the determination of bridge end elevations (Activity 17), the Bridge Bureau will prepare the preliminary layout of bridges within the project limits. The basic objective of the preliminary layout is to determine what appears to be the most appropriate superstructure and substructure type and configuration for the given or anticipated site conditions. The preliminary bridge layout is based on the evaluation of many factors, including geometrics, hydraulics, structural loads, anticipated foundation conditions, seismic loading, environmental and right-of-way impacts, aesthetics and construction costs.

After selection of the structure type and size, the Bridge Area Project Supervisor will prepare the general layout of the bridge, which will present the:

1. plan and profile of the bridge showing the proposed type of superstructure and foundation, bridge end elevations, location of expansion and fixed ends, highway approaches and existing contours at the bridge site;
2. channel profiles and pier locations;
3. bridge curb, sidewalk and/or shoulders;
4. design loadings, stresses, specifications and other structural criteria;
5. controlling horizontal and vertical clearances; and
6. hydraulic data, high and low water elevations, drift, ice, etc.

The Bridge Bureau will provide bridge layout information to the Area Project Supervisor before the Scope of Work Report is prepared (Activity 35).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Detailed Geometric Design

Activity No.: 32

Responsible Unit: Traffic Engineering Section

Activity Description:

Based on the preliminary evaluation (Activity 12) by the Traffic Engineering Section and the Alignment Review Report (Activity 25), the Traffic Engineering Section will perform the detailed geometric design project work for those geometric design elements which are the responsibility of the Section. As needed for the specific project under design, the work will include:

1. the design of any truck-climbing lanes,
2. the preliminary layout indicating the location of highway lighting, and
3. the design of any at-grade intersections and interchanges.

The Traffic Engineering Section will submit its plans and other necessary information to the Area Project Supervisor for incorporation into the road design plans (Activity 44).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Implement Railroad Process

Activity No.: 33

Responsible Unit: Various

Activity Description:

Based on the Alignment Review Report (Activity 25), the Utilities Section will work with any impacted railroad companies and other Department units to implement the railroad coordination process. This process may include the following:

1. The Utilities Section will prepare the Railroad Agreements and work with the railroad companies to gain their input and approval.
2. For any work at the crossing itself (e.g., replacing the railroad crossing surface, improving drainage), the railroad company will advise the Department of its requirements to be incorporated into the plans.
3. For any passive traffic control devices at the crossing (e.g., signs, pavement markings), the Utilities Section will coordinate with the Traffic Engineering Section to determine the appropriate design.
4. For any active traffic control devices (e.g., flashing lights, automatic gates), the Utilities Section will verify the warrants for these devices. The Road Design Section will design the crossing in coordination with the railroad company. The Traffic Engineering Section will recommend locations of the railroad signals or recommend protection if they must be located within the clear zone. The railroad companies will perform the design work and construction of the electrical components of the active traffic control devices.
5. The Road Design Section is responsible for the detailed design of the roadway approaching the crossing.
6. For any grade-separated highway bridges over railroads, the Bridge Bureau is responsible for the structural design in coordination with the railroad company (e.g., the bridge must meet the horizontal and vertical clearance requirements of the railroad).
7. For any grade-separated railroad bridges over highways, the railroad company is responsible for the structural design in coordination with the MDT to meet the Department's road design criteria.

The Utilities Section will ensure that the railroad process is completed before the project letting (Activity 53).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Conduct Informal Public Meeting

Activity No.: 34

Responsible Unit: District Administrator/Area Project Supervisor/Rail, Transit and Planning Division

Activity Description:

The District Administrator or the Area Project Supervisor requests the Rail, Transit and Planning Division to schedule an informal public meeting. The basic objective of the meeting is to present the project to the public, solicit comments on the project design and answer any questions. The responsibilities for the informal public meeting will involve:

1. preparing an aerial display (the Area Project Supervisor);
2. preparing exhibits, presentations, handouts, etc., for the meeting (the Area Project Supervisor);
3. conducting the meeting in accordance with MDT practices (the District Administrator); and
4. after the meeting, preparing a memorandum to the file briefly documenting any significant comments by those in attendance and actions resulting from these comments (the Rail, Transit and Planning Division or the Area Project Supervisor).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Scope of Work Report

Activity No.: 35

Responsible Unit: Area Project Supervisor

Activity Description:

At this stage of project development, the Area Project Supervisor will have received or prepared:

1. the Alignment Review Report (Activity 25),
2. input from the public (Activity 34),
3. the bridge layout information (Activity 31),
4. the initial traffic engineering evaluation (Activity 12),
5. the draft environmental documents (Activity 26), and
6. the hydraulics information on major drainage or irrigation facilities (Activity 15).

This information allows the Area Project Supervisor to prepare the Scope of Work Report for the road design project. The purpose of the Report is to document all major design features for the proposed project. Unless opposition is received, the Report will form the basis for all detailed engineering work required for the project, including road design, structural design, right-of-way design and utility adjustments. After concurrence from all MDT Bureau Chiefs, the Scope of Work Report is distributed to the following:

1. all Bureau Chiefs, including the Preconstruction Engineer,
2. Preconstruction Design Engineer,
3. District Administrator,
4. Road Design Engineer,
5. all necessary Section Heads,
6. ADA Coordinator,
7. FHWA, and
8. the preconstruction project file.

Chapter Three "Administrative Policies and Procedures" discusses the format and content of the Report in detail.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Finalize Right-of-Way Plans

Activity No.: 36

Responsible Unit: R/W Design Plans Section

Activity Description:

Based on the submittal of the final construction limits, the Scope of Work Report (Activity 35) and the R/W design (Activity 28), the R/W Design Plans Section will finalize the R/W plans. The R/W Design Plans Section will be using the initial R/W plans (Activity 20) as the base drawings for its work. Depending upon the Alignment Review Report (Activity 25), one of the major purposes of the final R/W plans is to clearly reflect adjustments in the construction limits of the project. The overall objective of the final R/W plans is to prepare the R/W Bureau for the R/W procurement process (Activity 45).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Implement Utility Process

Activity No.: 37

Responsible Unit: Utilities Section

Activity Description:

Based on the Scope of Work Report (Activity 35) and the initial utility plans (Activity 29), the Utilities Section will work with any impacted utility companies and municipalities to implement the utility process. This process may include the following:

1. Plan Preparation. The utility companies are responsible for preparing all utility adjustment/relocation plans, based on the initial plans prepared in Activity 29. The plans will be developed according to the criteria in the *Montana Utility Accommodation Policy*.
2. Funding. Depending on the right-of-way ownership for existing and proposed utility locations, highway funds may be eligible for utility adjustment/relocation required by the highway project. The utilities pay for all betterments.
3. Agreements. The Utilities Section will prepare a Utility Agreement for each affected utility and will work with the utility companies to gain their input and approval.

The Utilities Section will ensure that the utility process is completed before the project letting (Activity 53).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Final Environmental Documents

Activity No.: 38

Responsible Unit: Environmental Services

Activity Description:

In Activity 26, the Environmental Services will have prepared the draft environmental documents. Based on the public input process (Activity 34) and the Scope of Work Report (Activity 35), the Environmental Services will prepare the final environmental documents. The possible outcomes from this Activity are:

1. Categorical Exclusion (CE). The environmental process would have ended in Activity 26 if the project was classified as a CE project; i.e., Activity 38 will not be necessary.
2. Environmental Assessment (EA). If the EA classification leads to the determination that the project will have no significant impact on the environment, the EA document in Activity 26 will have stated this conclusion. The purpose of Activity 38 will be to prepare a Finding Of No Significant Impact (FONSI).
3. Environmental Impact Statement (EIS). If a Draft EIS was prepared in Activity 26, the purpose of Activity 38 will be to prepare the Final EIS to reflect any comments in the review process and to document the final decision on project alternatives.

Once the environmental document is completed, the road designer will incorporate the necessary features into the plans to reflect the mitigation measures described in the document (Activity 44).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Detailed Structural Design

Activity No.: 39

Responsible Unit: Bridge Bureau

Activity Description:

Based on the Scope of Work Report (Activity 35) and the preliminary layout of bridge (Activity 31), the Bridge Bureau will perform the detailed structural design of any bridges. The basic objective of the detailed design phase of bridge development is to perform the in-depth structural analyses which are necessary to prepare a set of construction plans. The structural analyses, as applicable, may include the:

1. superstructure design (e.g., framing details, deck slab, camber diagram),
2. substructure design (e.g., piers, abutments),
3. foundation design,
4. approach slab design, and
5. bridge rail design.

Once completed, the Bridge Bureau will submit the general layout and footing plan sheets to the Area Project Supervisor for direct insertion into the Plan-in-Hand Plans. This Activity will be completed before the Plan-in-Hand Review (Activity 47).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare Detailed Road Design Plans

Activity No.: 40

Responsible Unit: Road Design Section

Activity Description:

With the approval of the Scope of Work Report, the designer will prepare the detailed road design plans. The road design will be based on the design criteria documented in the *Montana Road Design Manual*. The overall objectives of this Activity are 1) to prepare for the Plan-in-Hand Review (Activity 47), and 2) to minimize the number of revisions required to the preparation of the final plans (Activity 49). Specific tasks in the detailed road design may include:

1. generating the detailed cross section, including any utilities potentially in conflict with the road design;
2. performing the earthwork calculations to achieve, if practical, an earthwork balance;
3. presenting the necessary details on the title sheet (e.g., project numbers, project length, traffic data, location);
4. presenting the necessary details on the typical sections (e.g., guardrail, ditch sections);
5. presenting the necessary details on the plan and profile sheets (e.g., grade percents, vertical and horizontal curvature data, structure sizes, stationing);
6. developing detailed plan sheets for interchanges based on the information from Traffic Engineering (Activity 12);
7. determining the need for and design of minor drainage facilities;
8. developing the temporary erosion control plan;
9. determining roadside safety treatments (e.g., barrier warrants);
10. developing plans for the maintenance and protection of traffic through the construction zone (i.e., the Traffic Control Plan);
11. developing details for special design elements (e.g., disabled accessibility, bike paths, fencing, cattle guards); and
12. preparing special provisions for road design items.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Finalize Geotechnical Design

Activity No.: 41

Responsible Unit: Geotechnical Section

Activity Description:

Based on the preliminary geotechnical evaluation (Activity 11) and the subsurface investigation (Activity 24), if conducted, the Geotechnical Section will finalize the geotechnical design. This may include:

1. designating special subbase material and providing subsurface drainage designs,
2. designing retaining walls, and
3. designing foundations.

The Geotechnical Section will submit the final design of the geotechnical items for inclusion in the road design plans (Activity 44).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Secure All Permits/Approvals

Activity No.: 42

Responsible Unit: Environmental Services

Activity Description:

After the preparation of the final environmental documents (Activity 38) and with the detailed road design plans (Activity 40), the Environmental Services will secure all permits required by the project. Depending upon the project-specific impacts, this may include any or all of the following:

1. Section 402, Temporary Erosion Control permit (from the Montana Department of Health and Environmental Sciences or the Federal EPA);
2. U.S. Army Corps of Engineers, Section 404/Section 10 permit(s);
3. approvals from the U.S. Fish and Wildlife, U.S. Forest Service and Bureau of Land Management;
4. applicable regional, tribal or State permits (e.g., 6.124 the Montana Stream Preservation Act (SPA) Permits);
5. Section 4(f) approval from FHWA;
6. Section 6(f) approval from Montana Department of Fish, Wildlife and Parks; and
7. Section 106 (SHPO) concurrence from the State Historical Preservation Offices.

All permits and approvals should be received by the Department before the check of the final plans (Activity 51).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Perform Detailed Traffic Engineering Design

Activity No.: 43

Responsible Unit: Traffic Engineering Section

Activity Description:

The Traffic Engineering Section will perform the detailed design for the permanent traffic control devices in the project. This will typically include:

1. the selection of the type of traffic controller (pretimed or traffic-actuated);
2. the selection of the traffic detector;
3. signal hardware and placement (i.e., for the pole, controllers and heads);
4. the detailed electrical design;
5. the phasing and timing for the traffic signal operation;
6. the detailed design for highway lighting; and
7. the selection and location of permanent signs and pavement markings.

The Traffic Engineering Section will also coordinate, as needed, with the appropriate local officials to secure any agreements (e.g., for maintenance of the signal).

The Traffic Engineering Section will complete the design of the traffic signals and submit the full set of plan sheets to the Area Project Supervisor for direct insertion into the construction plans. This Activity will be completed before the Plan-in-Hand Review (Activity 47).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Incorporate Hydraulic, R/W, Geometric and Environmental Impacts

Activity No.: 44

Responsible Unit: Area Project Supervisor

Activity Description:

At this stage of project development, the Area Project Supervisor will have received the following information from other MDT units:

1. The Hydraulics Section will submit the completed hydraulic design for roadway elements (Activity 30).
2. The Traffic Engineering Section will submit the detailed plans for the geometric design of intersections, interchanges, truck-climbing lanes, etc. (Activity 32).
3. The R/W Bureau will conduct an office plan review with the Road Design Section and will submit the final R/W plans (Activity 36).
4. The Environmental Services will submit the final environmental documents (Activity 38).
5. The Geotechnical Section will submit its final recommendations on the geotechnical design (Activity 41).

The Area Project Supervisor through his designee will review these materials 1) to identify any information which must be incorporated directly into the detailed road design plans prepared in Activity 40 (e.g., the location of drainage inlets), and 2) to assemble those plan sheets prepared by others into the overall set of construction plans (e.g., intersection design plan sheets).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Implement R/W Procurement Process

Activity No.: 45

Responsible Unit: Right-of-Way Bureau

Activity Description:

Based on the final R/W plans (Activity 36), the final environmental documents (Activity 38), and any revisions from Activity 44, the R/W Bureau will implement the R/W procurement process. This will include the R/W functions of appraisal, negotiation, acquisition and, if necessary, condemnation. The R/W Bureau will also negotiate the terms of any construction permits, permanent R/W easements and/or temporary R/W easements.

The R/W Bureau will ensure that the R/W procurement process is completed before the distribution of the final plans (Activity 49).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Estimate Project Quantities

Activity No.: 46

Responsible Unit: Road Design Section

Activity Description:

Based on the detailed road design plans (Activity 40) as modified by Activity 44, the designer will calculate the project quantities for roadway design items. The project quantities will be calculated according to Chapter Five of the *Montana Road Design Manual* and the *Montana Standard Specifications for Road and Bridge Construction* for pay items, units of measurement, rounding conventions, etc. The information is placed on the Summary Sheet within the construction plans. A preliminary construction cost estimate will also be prepared (see Chapter Seven).

Other units of the Department are responsible for calculating and documenting project quantities for structural items, electrical items and traffic control devices.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Conduct Plan-In-Hand Review

Activity No.: 47

Responsible Unit: Area Project Supervisor

Activity Description:

At this stage of project development, all major design decisions have been made, including roadway, traffic, hydraulic and structural design. The Area Project Supervisor is responsible for scheduling the Plan-In-Hand (PIH) Review of the project. The PIH is an in-depth office and on-site review of all project elements to ensure that all details have been satisfactorily incorporated into the construction plans and that the project is ready to advance to construction.

The Area Project Supervisor will typically invite all applicable MDT Bureaus and the District Engineer to the PIH Field Review.

On projects with minor complexity of work, the Plan-in-Hand Review may be held via the mail. Plans, special provisions and cost estimates are sent to the District, FHWA and local officials for review and comment.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare PIH Report

Activity No.: 48

Responsible Unit: Area Project Supervisor

Activity Description:

The Area Project Supervisor through his designee is responsible for preparing the PIH Report to document all significant decisions made during the PIH Review (Activity 46). After the Report has been approved by the Road Design Engineer and Preconstruction Engineer, the Area Project Supervisor will distribute the Report to:

1. all applicable Bureau Chiefs,
2. Preconstruction Design Engineer,
3. District Administrator,
4. Rail, Transit and Planning Division Administrator,
5. all parties involved in the field review,
6. any other individuals or sections as deemed appropriate, and
7. FHWA.

All parties receiving a copy of the PIH Report are requested to provide comments on the Report. Concurrence of the Report will be assumed if no comments are received by the specified date.

Chapter Three discusses the format and content of the PIH Report in detail.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Prepare and Distribute Final Plans

Activity No.: 49

Responsible Unit: Area Project Supervisor/Others

Activity Description:

All Bureaus and Sections responsible for their respective project plans will make all plan changes as needed based on the PIH Review and PIH Report (Activities 47 and 48). This will produce the final set of project plans ready for construction. Specifically for road design, the designer will be responsible for revising the road design plans.

Once completed, the Area Project Supervisor will distribute the final construction plans (including bridge and signing plans) to all parties who have been involved with the project for their review and comment within a specified time period.

A formal on-site review may be conducted, if determined to be necessary.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Finalize Utility Process

Activity No.: 50

Responsible Unit: Utilities Section

Activity Description:

The PIH Review (Activity 47) and final plans (Activity 49) may precipitate changes to the project design which affect utilities. For example, it may be necessary to prepare a special provision for utilities work. As necessary, the Utilities Section will modify its work performed during Activity 37 on the utilities process. The Section will complete the Activity before project letting (Activity 53).

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Check Final Plans

Activity No.: 51

Responsible Unit: Plan Checker

Activity Description:

The Plan Checker will conduct a final review and check of the final set of plans to ensure that they are accurate, complete, legible and constructable. The purpose of the check is not to evaluate the project scope but, rather, to evaluate the design methodology, to locate any significant errors, and to ensure that the contractor will be able to construct the project as designed.

The Plan Checker notifies the Area Project Supervisor or designer of any needed changes to the plan set.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Submit Package to Contract Plans Section

Activity No.: 52

Responsible Unit: Area Project Supervisor

Activity Description:

The Area Project Supervisor will transmit the entire project package to the Contract Plans Section for final processing with copies to the District Office, Construction Bureau and Environmental Services. The package will include the following items:

1. final, original construction plans,
2. road design cost estimate (to the Contract Plans Section only), and
3. any Special Provisions.

The Contract Plans Section will review the final construction plans and distribute the plans for review by other MDT sections. The Area Project Supervisor will review the comments and suggestions and determine if changes or corrections are warranted. The Area Project Supervisor will be responsible for incorporating any appropriate revisions into the plans resulting from this review.

This Activity completes the road design process. However, the Area Project Supervisor may be requested to attend the pre-bid conference or preconstruction conference with the contractor.

MONTANA ROAD DESIGN ACTIVITY

Activity Title: Implement Letting Process

Activity No.: 53

Responsible Unit: Contract Plans Section

Activity Description:

The Contract Plans Section will implement the project letting process, which will include:

1. circulating the construction plans for review and comment;
2. preparing the Engineer's Estimate;
3. preparing the Contract Proposal, including the Special Provisions, Supplemental Specifications and construction schedule;
4. processing the PS&E documents;
5. preparing the Bid Proposal;
6. ensuring that all necessary clearances have been obtained, including:
 - a. right-of-way certificate,
 - b. approved utility agreements,
 - c. approved agreements,
 - d. permit approvals,
 - e. approved local agency agreements, and
 - f. FHWA approvals (PR-1240, experimental features);
7. advertising the project;
8. conducting a pre-bid conference (required for all projects on Indian reservations; may also be required unusual projects);
9. conducting the bid opening;
10. reviewing all bids including a review of bids with respect to the Engineer's Estimate, DBE/WBE requirements, bonds, signatures, etc.; and
11. preparing a recommendation for the Chief Engineer on whether or not to award the contract.

